



History of  
**U. S. NAVAL  
RADIOLOGICAL  
DEFENSE  
LABORATORY**

SAN FRANCISCO CALIFORNIA

or industry; Evaluation Reports, which evaluate products or materials; and Review and Lecture Reports, which are either literature searches or lectures given by Laboratory members at meetings.

Apart from these Laboratory publications are those technical reports written on the results of Laboratory participation in weapons tests conducted at Eniwetok or in Nevada by the Department of Defense - Atomic Energy Commission. Each field operation is composed of several projects, each of which is recorded in a report. There are three stages for every report:

- (1) Pre-test Report describing the data sought.
- (2) Interim Report (ITR), a preliminary report written at the test site, indicating the data received from the test.
- (3) Draft of the final Weapon-Test Report (WT) which is written after the data have been analyzed and interpreted. The Weapons Test Reports are actually published by the Armed Forces Special Weapons Project.

Total reports issued by the Laboratory by types are:

|   |       |     |
|---|-------|-----|
| U. S. Naval Radiological Defense Laboratory Reports | ----- | 121 |
| Atomic Defense Reports (AD)                         | ----- | 338 |
| Manuals (Drafts)                                    | ----- | 7   |
| Technical Reports (USNRDL-TR)                       | ----- | 287 |
| Technical Memoranda (TM)                            | ----- | 98  |
| Progress Reports (P)                                | ----- | 17  |
| Instrument Evaluation Reports                       | ----- | 42  |
| Evaluation Reports                                  | ----- | 7   |
| Review and Lecture (RandL)                          | ----- | 72  |
| Weapon-Test Reports (WT)                            | ----- | 74  |

Following are descriptions of some of the larger technical publications. One of the early significant formal contributions by the Laboratory was the summary of the state of knowledge at that time prepared in 1949 for the 1950 edition of "Effects of Atomic Weapons". About the same time, material was prepared which formed the basis for Volume II of "Radiological Defense", published by the Armed Forces Special Weapons Project in 1951. This early work was applicable only to liquid contamination. In 1951 studies of the reclamation of land targets were begun with

aircraft-collected samples during Operation GREENHOUSE. The data obtained are unimportant today, but the effort represented the first real break with the tradition of liquid contamination and also involved the first attempt to simulate a dry fallout for experimental purposes. The underground shot at Operation JANGLE produced a heavy, visible deposit of fallout and permitted a clear distinction between liquid and dry fallout. It became clear that decontamination of dry fallout would reduce radiation levels by at least a factor of 10. These JANGLE experiments are still the only full-scale reclamation studies conducted at a field test, although the Laboratory has since (in 1956 and 1958) carried out large-scale engineering studies of land target reclamation at other locations, particularly at Camp Stoneman. These studies included the development of an effective fallout simulant which affords the opportunity for valid experiments in a continuing program of land target reclamation investigations at nearby locations. The state of knowledge at the time was represented by "Radiological Recovery of Fixed Military Installations", a joint-service manual prepared by NRDL during 1952 and 1953 and issued by the three services in August 1953.

During Operation CASTLE in early 1954, the accidental injury of people a hundred miles from Shot Bravo ground zero gave a new dimension to the fallout problem, and the tremendous area of hazard made a profound impression.

Megaton-yield weapons gave radiological defense a priority status, but tests in the coral atolls of the Pacific produced a typical fallout. This fact led to the development of fallout simulants and to continually-refined theories of decontamination such as "Theory of Decontamination, Part I", which emphasizes removal of material mass rather than radioactivity.

The most recent reclamation information is summarized in the April 1958 revision of "Radiological Recovery of Fixed Military Installations" (Army TM 3-225; Navy Bureau of Yards and Docks TP-PL-13). Little remains of the 1953 version. It is shown that in some instances, dose may be reduced by a factor of 100; recovery planning is reduced to a definitive step-by-step process.

#### PUBLICATION IN THE OPEN LITERATURE

Hand in hand with the issuing of reports on scientific investigations go the journal articles which are largely responsible for building the reputation of the individual scientist as well as his organization. Laboratory investigators have had approximately 1,000 of these printed in such major scientific journals as Analytical Chemistry, American Journal of Physiology, Blood, Cancer Research, Journal of Applied Physics, Nucleonics, Journal of Colloid Science, Physical Review, Journal of the American

divided into individual units for smaller showings. Originally intended for display at the Bureau of Ships, this exhibit has been seen on a number of occasions in the Bay Area.

## PUBLICITY

During the first five years the Laboratory was "under wraps". Gradually, however, word of its existence was spread, and in January 1951 the first series of articles on its work and personnel appeared in the San Francisco NEWS. From that time on NRDL has been a popular subject for different types of publications, radio and television.

### Publications

Two items appeared in the Bureau of Ships JOURNAL in 1953, both dealing with the Laboratory as a whole. An interesting article entitled "Navy Vs the H-Bomb," was featured in COLLIER'S for 23 July 1954, with the cover showing a carrier being bathed with waterspray known as washdown. In a special radiation issue in February 1956, the Office of Naval Research RESEARCH REVIEWS devoted the entire journal to NRDL including certain of the talks given at its dedication scientific program.

Twice in February 1957 the wire services printed news stories based on the testimony by Laboratory personnel regarding the feasibility of providing nation-wide underground shelters to give Americans a high chance of survival of an atomic attack. The second item described the four types of shelters, a plan that is the outgrowth of the Laboratory's responsibility to develop a countermeasures system against the effects of nuclear weapons. A bit later LIFE publicized the shelter idea, using illustrations made in the Laboratory and quoting Dr. Edward Teller as saying the "NRDL is the only place where this problem has been attacked in a consistent and reasonable manner." Press coverage of the NRDL shelter plan has included almost every major newspaper in the country. Also early in 1957 BUSINESS WEEK carried a feature story about NRDL titled "Navy Builds Itself an Atomic Age Lab." that pointed out many features of the Laboratory building and touched on certain experiments being conducted there. Within a month the American Society of Naval Engineers published a talk given at Monterey to scientists and executives by the Commanding Officer and Director, and, later in the spring, Laboratory chemists made headlines on two occasions. A paper describing synthetic fallout studies received considerable attention. The New York TIMES gave it broad coverage and a syndicate serving 400 eastern papers

## ADDENDUM

### ANNUAL HIGHLIGHTS

Since it is sometimes difficult to place an occurrence properly in time, the following summary of important events or progress in the life of the Laboratory is chronologically listed:

- 1946 - Laboratory for radiological studies established as activity of BuShips and part of the San Francisco Naval Shipyard.
  
- 1947 - Move to Bldg. 506 - Established as Radiation Laboratory of SFNS and separated from the Industrial Laboratory - First sponsors - First Mission defined - Simple organization chart proposed - First Progress Report - Change of Command, LT Preston to CDR Fee - Civilians added to staff.
  
- 1948 - Mission restated - First Boards and committees formed - Acquired additional Shipyard buildings - First recorded specific scientific program - Name changed to Naval Radiological Defense Laboratory - First glass apparatus made - Dosimetry program organized - BULLETIN initiated in February as "Technical Director's Bulletin"; changed to "Scientific Director's Bulletin" in October and to "Laboratory Weekly Bulletin" in November.
  
- 1949 - First formal organization chart - Laboratory operated as a regular work day on a Saturday to greet the Research and Development Board's Committee on Atomic Energy. Enthusiasm of the Committee resulted in a visit the next week by the Under Secretary of the Navy - Scientific Director appointed to National Committee on Radiation Protection.

- 1950 - Made separate activity and name modified to "United States Naval Radiological Defense Laboratory" - New building requested - Assistance with radium spill on Treasure Island - Change of Command, CDR Fee to CAPT Bird.
- 1951 - Organized into departments -- Field Operations GREENHOUSE, RANGER, BUSTER/JANGLE - Firsts: Laboratory patent, lab-wide seminars, newspaper publicity, exhibit, radio program and Lab movie - New building approved - Change of Scientific Director, Dr. Sullivan to Dr. Tompkins.
- 1952 - Building 351 completed and occupied - Ground broken for new building - Field Operations IVY, TUMBLER/SNAPPER - Administrative Manual produced - Assistance with nuclear accident at Chalk River, Canada - NRDLERS' Handbook initiated - Wider publicity received - Increased participation in scientific meetings - Bowling and golf tournaments - Carolers.
- 1953 - Awards program moved from SFNS - Field Operation UPSHOT/KNOTHOLE - First Thermal Injury Symposium - NRDL speakers in demand - First Lab TV program - Guards transferred to NRDL - First Safety awards - Change of Command, CAPT Bird to CAPT Hanners.
- 1954 - Van de Graaff building completed (Held Open House with 600 visitors) - Field Operation CASTLE (Washdown proved effective) - Provided members for medical team to care for people exposed to fallout in Pacific - Meeting of the National Research Council Committee on Naval Medical Research - Visited by CNO and Chief BuShips and many other high ranking individuals - Bowling team won League pennant.

- 1955 - Detailed mission defined - Laboratory building completed and occupied - Established as separate command - First Open House - Dedication - Initiation of Scientific Director's Colloquia - Field Operations WIGWAM, TEAPOT - First scientific exhibit constructed - First summer employees - Self-Service Store (later Ready Supply Store) established - First Superior Accomplishment Award - WE of NRDL organized.
- 1956 - "Success Story" on TV - Field Operations REDWING, STONEMAN - Participation in Congressional Hearings on Civil Defense - Second Open House - 1 Mev X-ray machine installed - Change of Command, CAPT Hinners to CAPT Mandelkorn - Shielding and Liver Symposia - Step-up in TV programs - Accelerated participation in scientific meetings and in numbers of guest speakers - Piano presented by WE of NRDL - Golf tournaments.
- 1957 - Scientific Director promoted to high level position - Authorized to classify Laboratory positions - Participation in Congressional Hearings on National Shelter Program - Two Changes of Command CAPT Mandelkorn to CAPT Schultz, and CAPT Schultz to CAPT McQuilkin - Co-Op Program initiated - Field Operation PLUMBBOB - First Medical Symposium - Lab-wide exhibit constructed - Marked increase in publications in scientific journals and in papers given at meetings - Publicity received on killer clams, high altitude radiation studies, atmospheric scattering experiments, shelters.
- 1958 - Associate Scientific Director promoted to high level position - Small changes in mission - Long range planning of research initiated - Field Operations HARDTACK and STONEMAN - Model Magnet and Datatron installed - PLUCON team activated - Plans prepared for facilities to control and monitor laboratory wastes - Negotiations begun for use of Camp Parks areas - Plans for Hydra Series - New irradiation and analyzing equipment acquired - Completion of Vol I of "Radiation and Contamination Control" - Lab played host to several group meetings and many important persons - Awards of NSF Fellowship and Radiological Society Gold Medal - Training emphasized - Provision made for NRDL Fellowships - Pattern of increased publicity sustained.